Course Outline

Semester 2 2016

Never Stand Still

Engineering | Mechanical and Manufacturing Engineering

MANF3510

PROCESS TECHNOLOGY AND AUTOMATION

Contents

8

1. Staff Contact Details

Contact details and consultation times for course convenor

Name: Dr Alex Green
Office location: ME507
Tel: (02) 9385 1535
Email: alex.green@unsw.edu.au

Other teaching staff

Name: Dr Erik van Voorthuysen
Office location: ME507
Tel: (02) 9385 4147
Email: erikv@unsw.edu.au

Name: Dr Ron Chan
Office location: ME507
Tel: (02) 9385 1535
Email: r.chan@unsw.edu.au

Name: Dr Nathan Parrott
Office location: ME507
Tel: (02) 9385 4147
Email: admin@nathanparrott.com

Name: Mr Alex Yellachich
Office location: ME507
Tel: (02) 9385 4147
Email: alexjelacic@gmail.com

Consultation concerning this course is available immediately after the classes. Direct consultation is preferred.

2. Course details

Credit Points:

This is a 6 unit-of-credit (UoC) course, and involves up to 6 hours per week (h/w) of face-to-face contact (contact hours will vary from 4 to 6 hours).

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week.”

This means that you should aim to spend about 9 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact Hours

	Day	**Time**	**Location**
Lectures	Monday	13:00 – 15:00	ASB 216
Demonstrations	Monday	15:00 – 17:00	ASB 216
	Wednesday	15:00 – 17:00	ASB 205

Summary of the Course

Key factors for success in modern manufacturing include quality, productivity, efficiency, flexibility, agility, and customer satisfaction all while maintaining control over cost. Depending on the characteristics of the product and its market, an appropriate manufacturing process needs to be designed. This course is closely aligned with the characteristics and requirements of small to medium scale manufacturing, entrepreneurial start-ups and prototyping.

MANF3510 builds on knowledge gained in MANF3100 Product and Manufacturing Design, where the aim is to develop a design or prototype into a product that can be successfully manufactured. MANF3510 takes this concept to the next stage by teaching you how to design a manufacturing process by specifying, selecting and integrating the basic building blocks of process technology and automation into a successful manufacturing process or machine. The course contains appropriate theory but also focuses on the required practical knowledge to be able to put this theory into practice.

The course covers the basic technology and elements used to design computerised and automated manufacturing systems. It deals with the principles of numerically controlled machine tools and their elements, from basic machines tic ems.asentsocfi theo.6(c)-2(al)2.6( )]Tmge by .326

Topics include:

- Function and control of CNC machine tools
- Sensors and actuators in automated systems
- Programming of CNC machine tools and PLCs
- Design and integration of machine elements
- Programmable logic controllers
- CAD/CAM principles and programming (SolidWorks and SolidCam)

This course includes a substantial amount of laboratory work

5.	Understand the capability and performance of off-the-shelf programmable logic controllers and be able to write and execute basic ladder programming of these devices.	PE1.3, PE2.2

4. Course schedule

Week	Lecture Topic (Mondays)	Labs (Mondays)
1	Introduction to Automation & Technology	No lab in week 1
2	Design and Control of CNC Machines, ISO code	CNC Machining
3	Machine and System Design	CNC Machining
4	Structural and Machine Elements, Machine Mechanisms	CNC Machining
5	Binary, Boolean Logic and Transistors	CNC Machining
6	Computer hardware, Memory and Addressing	Quiz 1: CNC and Automation Technology
7	Sensors, Controllers, Programmable Logic Controllers 1	Setting up Omron Software on Student PCs. Bring PC with Windows and Ethernet Port.
8	Programmable Logic Controllers 2, Communications	PLC Basics
9	Power, Cabling, Actuators and Motors	PLC Intermediate
10	Pneumatics	PLC: Actuators, Sensors and Control
11	Standards, Regulations, Safety	PLC: Actuators, Sensors and Control
12	HMI, SCADA, Data Acquisition	Quiz2: Control, Sensing, technology, PLCs
13	No lectures in week 13	

5. Assessment

Assessment Overview

Assessment	Topic	Weight	Learning outcomes assessed	Assessment criteria

It is always worth submitting late assessment tasks when possible. Completion of the work, even late, may be taken into account in cases of special consideration.

Examinations

Part of the assessment includes two quizzes (10% each) and a final exam. The quizzes are designed to assist the learning and understanding of the underlying theory of the course and to help prepare you for the final exam. All questions in the quizzes and exam will require either short written answers or analysis and calculations or both. Tutorial problems will also be provided.

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see the Exams section on the intranet.

Calculators

Textbooks:

Industrial Automation – Hands-on, Frank Lamb, 2013, McGraw Hill. This textbook is available through the bookstore at UNSW and a copy will be put into the 'High-Use Collection' section of our library.

Reference books:

1. Manufacturing Process Selection Handbook: From Design to Manufacture, Swift K.G., Booker J.D., 2013, Burlington, Elsevier Science, ISBN 9780080993607 – available from our library electronically
2. Applied Metrology for Manufacturing Engineering, Grous A, 2011, ISTE, John Wiley & Sons, Inc, ISBN 9781848211889
3. Low-cost Jigs, Fixtures & Gages, for limited production, Boyes W.E. ed., Society of

academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here: www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Further information on School policy and procedures in the event of plagiarism is available on the intranet.

9. Administrative Matters

All students are expected to read and be familiar with School guidelines and polices, available on the intranet. In particular, students should be familiar with the following:

- Attendance, Participation and Class Etiquette
- UNSW Email Address
- Computing Facilities
- Assessment Matters (including guidelines for assignments, exams and special consideration)
- Academic Honesty and Plagiarism
- Student Equity and

Appendix A: Engineers Australia (EA) Professional Engineer Competency Standards

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and